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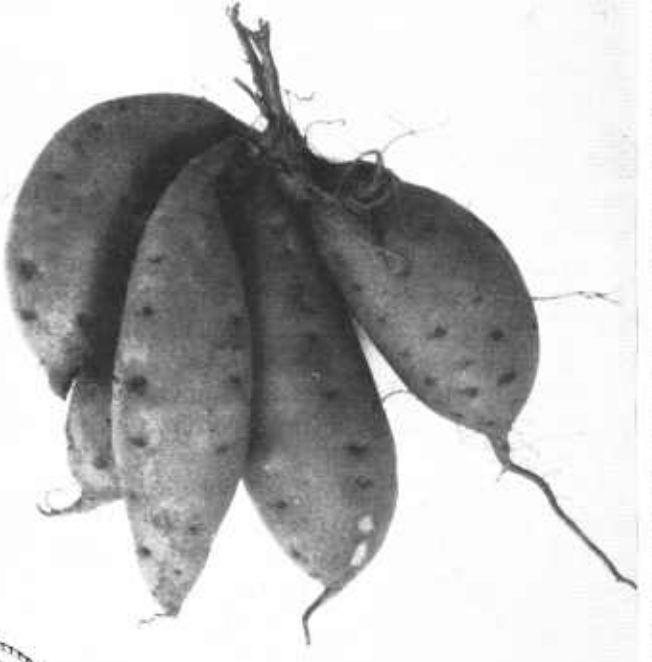
SWEETPOTATO GROWING



SWEETPOTATOES can be grown for home use under a wide range of conditions, but the commercial production of the crop is limited to sections where soil, climate, and marketing conditions are favorable.

Sweetpotatoes fit well in a rotation of farm or truck crops; and if improved methods of growing and storing the crop are employed, the crop is usually a satisfactory one.

The sweetpotato is propagated by plants or slips and by vine cuttings. The plants are produced by sprouting seed potatoes in warm sand. The cuttings are made in the field after the plants begin to vine.

When heat from beneath is necessary for growing the plants, the hotbed can be heated with manure, by flues, or by steam or hot-water pipes. In the South, where no bottom heat is necessary, the plants are grown in beds in the open ground.

Careful seed selection and disinfection, thorough preparation of the soil, and proper methods of fertilization and of setting plants are important factors in success.

The crop must be carefully harvested and handled, and if to be kept must be stored in a suitable storage house.

Careful packing in attractive packages is a requisite to profitable returns.

This is a revision of, and supersedes, Farmers' Bulletin 324, Sweet Potatoes.

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SWEETPOTATO GROWING

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IMPORTANCE OF THE SWEETPOTATO CROP

THE sweetpotato is second only to the potato in its importance as a commercial truck crop. It is suitable to be grown in many sections where the boll weevil has interfered with the production of cotton, while the development of the sweetpotato storage house [1] has greatly lengthened the season through which sweetpotatoes are available on the markets and thereby has stabilized the industry. The sweetpotato is one of the principal vegetable foods of people in the Southern States, and its use can be greatly increased in all sections of the United States but especially in the North, as they can be stored and cured, and then later be shipped to any part of the United States. Yields of as much as 100 barrels per acre can easily be obtained; and when the crop is well handled it ordinarily will return a profit.

Sweetpotatoes can be grown for home use under a wide range of conditions; but when they are to be produced commercially, careful consideration should be given to the soil and climate and to market, transportation, and storage facilities. The southern and many of the eastern markets usually are well supplied with sweetpotatoes, but in many sections in the North and West the people have not become accustomed to using them.

[1] Farmers' Bulletin 1442, Storage of Sweet Potatoes.

REGIONS ADAPTED TO SWEETPOTATOES

The sweetpotato, being a native of tropical America, naturally thrives best in the warmer portions of the United States. Nearly 90 per cent of this crop is produced in the Southern States. The areas suited to its commercial production, as indicated by the dotted portions of the map in Figure 1, extend from New Jersey southward and westward to Texas and include central and southern California.

The climate best suited to sweetpotatoes has a growing period of at least four months, a moderate rainfall during this period, warm nights, and plenty of sunshine. In sections where the rainfall is very light, growers resort to irrigation with considerable success. Care should be exercised as to the time of applying the water. The

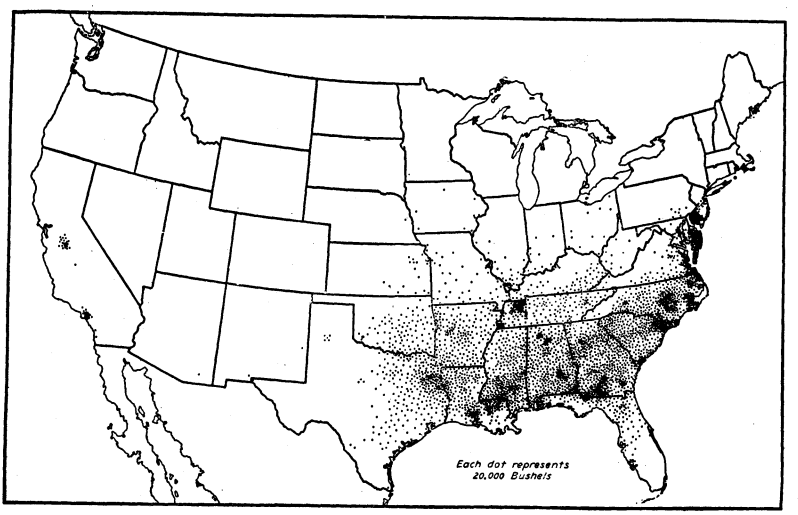

FIGURE 1.—Map of the United States showing the areas where sweetpotatoes are grown

greatest quantity should be applied between the time of setting the plants and the time when the vines practically cover the ground. Too much water applied during the latter part of the growing season will produce a very heavy vine growth at a sacrifice of the roots. The water should be withheld altogether for some time before harvesting the crop, in order to give the sweetpotatoes proper ripening conditions.

SOILS ADAPTED TO SWEETPOTATOES

A light well-drained sandy loam with a clay subsoil is the ideal soil for sweetpotatoes, although the crop can be grown with success on a wide range of soils if the growing period is sufficiently long. Sweetpotatoes are sometimes grown in almost pure sand, and with a reasonable quantity of commercial fertilizer good results may be obtained. On very fertile soils the crop tends to run to vines at the expense of the roots; moreover, the sweetpotatoes formed are likely to be rough and irregular in appearance, which reduces their market

value. Fair yields can be obtained on worn-out cotton and tobacco lands in the South, especially where a good rotation is followed and a leguminous crop is turned under. A moderate quantity of organic matter in the soil is essential for the best results in growing sweetpotatoes on soils lacking in fertility.

Sweetpotatoes are particularly adapted to newly cleared lands, such as the cut-over pinelands of the South. It is better, however, to grow corn the first year and follow this with sweetpotatoes the second year. This is especially true of land that has been recently cleared, because the roots of trees and shrubs interfere with cultivating and harvesting the sweetpotatoes.

Good drainage is just as important for sweetpotatoes as for other crops. It is never advisable to plant this crop on any soil unless it is fairly well drained, and even then in most cases it is best to plant on ridges to keep the surface water from standing around the plants. The surface soil should be 6 to 8 inches in depth and underlain with a clay subsoil porous enough to carry off the surplus water and yet of such a nature as to prevent fertilizers from leaching away. A deep surface soil with a sandy or very porous subsoil will produce long stringy roots which are unfit for market. On the other hand, the surface soil may be too shallow. In such a case it should be deepened each year by gradually increasing the depth of plowing until the desired depth is obtained.

ROTATION OF CROPS

In growing sweetpotatoes crop rotation is important from the standpoints of soil improvement, increased production, and the control of disease. A rotation in which sweetpotatoes are grown once in three or four years, combined with seed selection and hotbed sanitation, is effective in reducing loss from stem rot, black rot, and other injurious diseases. By following a rotation which includes crops having different feeding habits and by plowing under green manures, the fertility of the soil is improved and larger yields of all the crops included in the rotation are realized. The practice of following the sweetpotatoes with a cover crop is good. In Virginia and regions farther north, when the sweetpotatoes are dug for early markets, crimson clover may be sown as a cover crop, provided the sweetpotatoes are off by September 1 to 15 in New Jersey, Delaware, and Maryland, and by September 30 in southern Virginia. Where the crop occupies the land until too late for planting crimson clover, a cover crop of rye or of oats and vetch should be used.

The following 3-year and 4-year rotations are offered as suggestions, but these should be varied according to conditions and local commercial crops.

For the Cotton Belt, where sweetpotatoes are grown as a farm crop.—(1) First year. (*a*) Cotton, followed by rye for winter pasture or as a crop to turn under; or, (*b*) corn, with cowpeas or velvetbeans planted as a soil-improving crop.

Second year. Sweetpotatoes, followed by a winter cover crop of rye or oats and vetch.

Third year. Oats, followed by peanuts or cowpeas.

(2) First year. Sweetpotatoes, followed by a winter crop of rye or oats and vetch.

Second year. Cotton, with rye sown between the rows for winter pasture or to turn under.

Third year. Corn, with cowpeas or velvetbeans planted as a soil-improving crop.

A 4-year rotation for the southern sweetpotato section.—First year. Sweetpotatoes.

Second year. Winter oats, followed by peanuts or cowpeas.

Third year. Cotton, with bur clover between the rows.

Fourth year. Corn, with cowpeas or velvetbeans between the rows.

A 3-year rotation for the Eastern Shore of Virginia and Maryland.—First year. Sweetpotatoes, followed by crimson clover or rye as a winter cover crop.

Second year. Early potatoes. On many farms corn is planted between the rows of potatoes at the last cultivation; on other farms the potatoes are followed by fall vegetables or cover crops.

Third year. Winter oats, followed by cowpeas for hay.

In planning a sweetpotato rotation, the importance of plowing under a soil-improving crop once every two or three years should be borne in mind. The crops to be included in this rotation will differ according to local conditions. Wherever practicable, a leguminous crop, such as cowpeas, soybeans, velvetbeans, or crimson clover, should be used in order to supply nitrogen as well as humus.

USE OF FERTILIZERS

Sweetpotato yields can usually be increased by the judicious use of commercial fertilizer. The kind and quantity of fertilizer that will give the best results depend on the type and fertility of the soil, the fertilization given to preceding crops, the climatic conditions, and the variety of sweetpotato to be grown. Although sweetpotatoes do not require as much commercial fertilizer for satisfactory yields as do many other vegetables, they are exacting in regard to the proper proportions of nitrogen, phosphoric acid, and potash. The ratio of nitrogen to potash is of great importance, especially with the Jersey type. Experiments have shown that an excess of nitrogen and a deficiency of potash tend to produce long, slender roots that are comparatively late in maturing and less desirable from a commercial standpoint. An abundance of potash with a moderate supply of nitrogen and phosphoric acid increases the earliness of the crop by hastening the formation of chunky marketable roots. If the crop is planted early and not harvested until late in the season, the use of excessive quantities of potash with the Big-Stem Jersey variety may, however, result in the production of a large number of oversized potatoes called jumbos. It is particularly important that a good stand of plants be obtained if the crop is heavily fertilized with a mixture containing a high percentage of potash, because the plants adjacent to missing hills in the row frequently produce many jumbo-grade potatoes. The results of fertilizer experiments indicate that a mixture containing 2 to 4 per cent nitrogen, 4 to 8 per cent phosphoric acid, and 10 to 15 per cent potash is best suited to the Jersey type of sweetpotatoes, the exact proportions within this range depending on the soil type and previous fertilizer treatment. Areas that have been treated with stable manure or leguminous green manure may not require more than 2 per cent nitrogen. Light, sandy soils with a leachy subsoil respond best to larger amounts. It is recommended that most of the nitrogen be in a readily available form if the crop is grown for early market. Successful commercial growers in the Atlantic Coastal Plains States generally apply 800 to 1,200 pounds of fertilizer per acre for the Big-Stem Jersey and Yellow Jersey varieties.

The moist-fleshed varieties, such as Porto Rico and Nancy Hall, which are grown largely in the South, require less fertilization than the Jersey varieties. Excessive quantities of nitrogen produce too heavy vine growth and retard the development of the fleshy roots. Very little additional nitrogen is needed on soils where stable manure or much leguminous green manure has been plowed under. Under average conditions in the South 400 to 600 pounds per acre of a 2–8–10 [2] or a 3–8–10 mixture is usually sufficient.

Commercial fertilizers, particularly those containing large quantities of potash and other soluble salts, have frequently failed to give satisfactory results because of improper methods of application. The common practice of distributing large quantities of fertilizer in the row where the plants are to be set often results in loss of plants and greatly reduced yields. Roots of the sweetpotato "draws" are very susceptible to injury if planted in contact with soluble fertilizer materials. Frequently the grower is unaware of the injury because it has not been sufficiently severe to kill the plants. In addition to retarding the early growth of the plant, root injury affords easy access to the organism that causes stem rot. Thoroughly mixing the fertilizer with the soil by cultivation or applying the materials a week or two before the plants are set may reduce the damage but will not entirely eliminate it. Broadcasting large amounts of fertilizer before planting may also cause injury. The safest procedure is to withhold fertilization until a week or two after the plants have been set. The material may then be applied on each side of the row and thoroughly mixed with the soil by cultivation. The 3-row distributor commonly used for applying fertilizer to truck crops has been found convenient for "side dressing" the sweetpotato crop. Some of the fertilizer may fall on the plants, but little or no injury will result if the foliage is dry. A riding cultivator equipped with fertilizer attachments is also well suited to this work, since it properly places the material and mixes it with the soil at one operation.

MANURES

Either stable manure or green-manure crops should be used on sandy soils for sweetpotatoes to increase the organic content and water-holding capacity. Stable manure may be applied to the preceding crop or broadcast during the fall, so that it will be partially decomposed before the sweetpotato plants are set. Growers of large sweetpotato acreages usually maintain the organic content of the soil by the use of green-manure crops. This is the more economical method at present because of the scarcity and high price of stable manure. Legumes, such as crimson clover, soybeans, vetch, and cowpeas, grown in rotation as soil-improvement crops, are best suited for this purpose. Crimson clover or vetch, when it precedes the sweetpotato crop, should be disked and plowed under at least a month before the plants are set. In the Atlantic Coastal Plains States from Virginia northward rye has also been successfully used as green manure. It is usually sown at the last cultivation of the corn crop

[2] Fertilizer mixtures are described in formulas with the percentages of plant food in the mixture stated in the following order: Nitrogen, phosphoric acid, and potash. Therefore a 2–8–10 mixture contains 2 per cent nitrogen, 8 per cent phosphoric acid, and 10 per cent potash.

and plowed under about April 1. In the South, where peanuts are used as a soil-improvement crop, the nuts are harvested by hogs and most of the vines and roots are left in the soil.

USE OF LIME

The amount of lime that can safely and profitably be used for sweetpotatoes depends on the degree of soil acidity and the crops grown in rotation. Liming experiments with sweetpotatoes have shown that yields can be greatly increased by the judicious use of lime on very strongly acid soils (below pH 5.0). Where sweetpotatoes are grown in rotation with potatoes, lime should not be applied in sufficient quantities to cause scab injury to the potato crop. Too heavy liming may also favor the development of sweetpotato scurf and thereby lower the quality of the product. Lime should be applied several months before the sweetpotato crop is planted and should be thoroughly incorporated with the soil to a depth of 3 or 4 inches, in order that its beneficial effect may extend sufficiently deep to provide favorable conditions for growth. It is recommended that the soil be tested for acidity. The county agricultural agent usually is equipped to do this. Very strongly acid soils should be limed at the rate of 1,000 to 1,500 pounds per acre with finely ground limestone or with 750 to 1,000 pounds per acre of hydrated lime if sweetpotatoes are grown in rotation with Irish potatoes. In rotation with peanuts, corn, cotton, or hay crops larger applications of lime may safely be used, but the soil should always be maintained in a slightly acid condition to prevent injury to sweetpotatoes from scurf.

PROPAGATING PLANTS

Sweetpotatoes are grown either from plants or slips produced from potatoes, or from vine cuttings. In the northern sweetpotato sections a large part of the commercial crop is grown from slips produced by sprouting seed potatoes in warm beds of soil. Here the slips are used for the main crop, while the vine cuttings, which commonly do not have time to make roots of marketable size, produce the seed crop for the next season.

South of Virginia sweetpotatoes are often grown from vine cuttings. In this case enough roots are bedded to produce sufficient slips for about one-eighth of the area to be planted. These slips are planted in the usual manner; and when the vines begin to run cuttings are taken with which to plant the remainder of the field.

When slips alone are used, from 6 to 8 bushels of seed sweetpotatoes are required to produce enough plants from the first pulling to set an acre. When two or three pullings are made, 3 to 4 bushels of seed ordinarily will produce slips enough for an acre. The quantity depends upon the distance between the plants in the field. The practice of New Jersey growers is to bed 1 bushel of seed roots for each 1,000 plants desired. With good roots in well-made and well-managed beds the number of plants produced will average much higher, but any excess over the number desired can usually be disposed of at a profit.

Whatever method is used in propagating the plants, precautions against sweetpotato diseases should be taken. (P. 23.)

GROWING PLANTS IN THE OPEN

In most sections of the South sweetpotato plants for the main crop can be produced in open beds. A well-protected location, preferably on the south side of a building or tight fence, is selected for the bed. The drainage should be away from the bed. An excavation is made, 5 or 6 inches deep, 5 to 6 feet wide, and as long as needed for the quantity of sweetpotatoes to be bedded. About 4 inches of sand or loose loam is put in the excavation and leveled; then the sweetpotatoes are placed by hand, leaving at least an inch of space between them. After the sweetpotatoes are bedded they are covered an inch deep with sand or loose loam. If the land is at all dry, the bed is then watered thoroughly by being sprinkled with a hose or a sprinkling can. When the plants begin to show through the surface an inch or two, more sand or soil is added, in order to develop a good root system. Some growers cover the sweetpotato bed with straw, hay, or leaves to prevent the surface from drying out too rapidly and to protect it from cold.

GROWING PLANTS IN COLDFRAMES

In the sections of the South where sweetpotatoes are grown as an early truck crop, the plants are often produced in a canvas-covered or glass-covered coldframe. In selecting a location for a coldframe

FIGURE 2.—A manure-heated hotbed, showing the sash removed and piled where they can readily be replaced in case of danger from frost

the same points should be considered as for an open bed. A location similar to the one shown in Figure 2 is satisfactory, as the beds are protected from the cold winds by a natural forest windbreak.

Coldframes may be built entirely above ground or partly below the surface. The usual practice is to make an excavation 5 to 6 inches

deep, 6 feet wide, and as long as necessary. A frame is made of 12-inch boards on the north or west side and 6-inch or 8-inch boards on the south or east side, and the ends are boxed up. The sides of the frame are held in place by stakes driven into the ground at intervals of about 6 feet or by pieces of board nailed across the top. If the bed is made below the surface of the ground, the frame should fit in the excavation. When built above ground the frame is nailed together and set on the surface, and earth is banked up against it all around in order to protect it from the cold. For a permanent bed, walls are made of concrete instead of wood.

The coldframe may be covered with canvas or with hotbed sash. When hotbed sash is used it is advisable to have crosspieces at intervals of 3 feet. These crosspieces act as supports for the sash.

After the coldframe is made, sand or loose soil is placed in the bed and the sweetpotatoes are bedded in the same way as in open beds.

USE OF MANURE-HEATED BEDS

In sections where the growing season is too short to allow the plants to be started in coldframes, it is necessary to grow them in hotbeds, bedding the sweetpotatoes about six weeks before weather conditions permit setting the plants in the fields. In order to obtain a quick growth of large, stocky plants, bottom heat is necessary. Usually the simplest method of supplying this heat is the use of fresh, rapidly fermenting horse manure, but the increasing scarcity and high cost of this material often make its use impracticable. The hotbed should be well protected from north and west winds, as shown in Figure 3. The directions for the construction of a manure-heated hotbed are similar to those given for building coldframes, except that the excavation under the frame is 12 to 18 inches deep. Before putting the manure in the bed it is a good plan to pile it and turn it two or three times in order to make it uniform throughout. The manure should be placed in the excavation to a depth of 8 to 12 inches and should be well trampled. If the manure is dry it should be watered as the hotbed is made, because moisture is essential to the decomposition by which heat is produced. As soon as heating starts, sand is spread evenly over the manure to a depth of 3 to 4 inches. When the soil temperature drops to 80° or 85° F., the sweetpotatoes are placed on the surface and covered with sand, as already explained.

A more permanent hotbed may be made with concrete walls. Where the concrete bed is to be heated by steam or hot water, the pipes are usually placed beneath a board floor. The floor of this type of bed must be repaired or renewed every two or three years.

USE OF FLUE-HEATED BEDS

Where large quantities of sweetpotato plants are required and it is difficult to obtain sufficient manure for hotbeds, the heat can be supplied by a stove or furnace connected with flues running under the bed. The flue-heated bed (fig. 3) is 6 to 12 feet wide and may be 100 feet long, but not longer. The side walls for a permanent bed are made of brick, stone, or concrete, but a temporary structure of wood will answer the purpose. The furnace or stove should be so placed that it may be fired from the outside or just inside a door

opening into the space beneath the bed. The stove or furnace is usually connected with 6-inch chimney tiles, which may run the entire length of the bed or discharge the heat into the open space beneath the floor of the bed 25 to 30 feet from the entrance. At the opposite end from the furnace a wooden chimney collects the gases and smoke and carries them to the open air. As the boards forming the floor of the bed absorb moisture from the soil, there is very little danger from fire; but when wood is used for fuel, it may be well to place a wire screen over the ends of the tiles to prevent the passage of sparks.

The floor of the bed usually is made of boards supported on timbers placed across the bed with the ends set into the walls. From 4 to 6 inches of sand or loose soil is placed on the floor, and the sweetpotatoes are bedded on this.

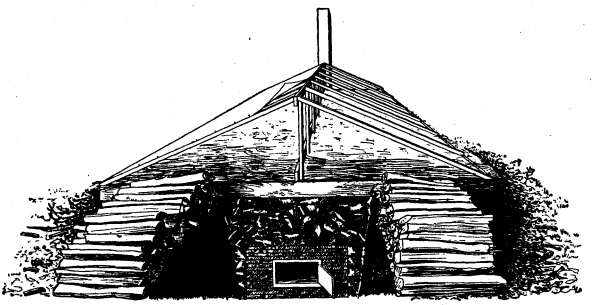

FIGURE 3.—A flue-heated hotbed used extensively by sweetpotato growers

In order to obtain a uniform temperature under all parts of the bed, it may be desirable to cover the horizontal chimney tiles with soil and to construct the bed so that there will be a gradual rise toward the chimney end.

USE OF PIPE-HEATED BEDS

Where a steam or hot-water boiler is used for heating a greenhouse, residence, or other structure, it can often be employed to very good advantage in heating the sweetpotato bed. In fact, where sweetpotato plants are grown on a very large scale it may be advisable to install hot water or steam heat even if it is not used for other purposes. The temperature of the bed can be regulated more easily where steam or hot water is employed than where other methods of supplying heat are used.

When steam or hot-water pipes are used to heat the hotbed, the best results are obtained when the pipes are placed near the bottom of the hotbed pit, the soil being put on a tile or board floor resting on pipe or wood supports so as to leave a space of a few inches between the bottom of the pit and the floor. The number and size of the heating pipes required depend on the rapidity of the circulation and on the temperature of the water or the pressure of the steam. When hot water is used, four 1½-inch pipes will be ample in most cases for beds not over 50 feet long. For longer beds 2-inch pipes should be used. Two of the pipes serve as flow pipes and two as returns. The water enters at one end, makes the circuit of the

bed, and leaves at the same end. The point where the pipes enter the bed should be the highest in the system, and the point where the pipes leave the bed the lowest in the system. The pipes should have a uniform grade and should be evenly spaced, with the flow pipes about a foot from each outside wall and the returns in the middle. When steam is employed the arrangement of the bed and pipes is the same, but smaller pipes may be used. With steam at 10 pounds pressure 1-inch pipes are large enough for 50-foot beds, and 1¼-inch pipes are ample for beds up to 100 feet long.

BEDDING THE SEED

The time for bedding sweetpotatoes differs in different parts of the country. In the northern sweetpotato sections the seed are bedded about a month before danger of frost is over, as it is necessary to have plants to set early in the spring in order to mature a crop before frost. The main crop of sweetpotatoes in the South is usually bedded long after danger of frost is past, and no bottom heat or protection is given.

Directions for the selection of seed stock and the disinfection treatment of the sweetpotatoes and plant beds for the control of diseases, given in Farmers' Bulletin 1059, Sweet Potato Diseases, should be carefully followed.

Clean sand is the best material in which to bed sweetpotatoes, but in the absence of this, fine sandy loam can be substituted. A 3-inch or 4-inch layer of sand or soil is placed in the bottom of the bed. In order not to chill the seed a warm, clear day should be selected for bedding them. They are placed by hand, bedded firmly in the sand, with at least an inch of space between them. If they are too close, the sprouts will be so crowded that long spindling plants will be produced. After placing the seed, cover them with sand or soil to the depth of about an inch, and when the sprouts begin to force their way through the surface apply 2 inches more of sand.

TEMPERATURE OF PLANT BEDS

The temperature of the plant bed should be allowed to fall below 85° F. before the seed is bedded and should remain more or less constant at 70° to 75° during the greater part of the period that the plants are growing in the bed or until planting-out time. A thermometer should be kept plunged in the soil of the bed and the temperature noted every day for the first 10 days or two weeks. If the manure hotbed is not in a well-drained location, there is danger of soil water getting in with the manure and either destroying the heat altogether or starting a second fermentation, which will cause the temperature to run too high and injure the sweetpotatoes. The air temperature beneath the sash or other covering should run between 70° and 80°, and during bright days it must be controlled by ventilation.

WATERING PLANT BEDS

As soon as the sweetpotatoes are bedded and covered with soil the bed should be thoroughly watered. Later waterings should be given whenever the soil becomes dry. The quantity of water required de-

pends somewhat upon the method of heating employed. With steam, hot-water, or furnace heat more watering will be necessary than if the ordinary manure hotbed is used. The water applied when the sweetpotatoes are bedded will generally be sufficient to last for several days, but after the plants begin to form leaves and the cover of the bed is left off during the greater part of the day, more frequent watering will be necessary. The water should never be poured on in a solid stream, but by means of a sprinkling can or through a hose or nozzle on the end of a hose. Very large plant beds will require the attention of someone most of the time to care for the watering, heating, and ventilation. The success of the crop depends largely upon properly managing the plant bed in order to produce the right kind of plants.

COVERING FOR PLANT BEDS

Throughout the Gulf Coast and South Atlantic States it may not be necessary to provide a cover to retain heat or protect the plants from cold, but farther north some form of cover is needed. In the northern part of the sweetpotato district glazed hotbed sash, each 3 by 6 feet in size, are most commonly used. In warmer sections a covering of light canvas or heavy muslin will be sufficient to protect the plant bed. Where sash are used they should slope to the south or east in order to admit the greatest amount of light. A canvas or muslin cover should be supported upon laths or wires in such a manner that water will drain off and not form puddles and drip upon the bed. Provision should also be made for rolling up the canvas on bright days to admit sunlight and obtain ventilation.

As the date for transplanting approaches, the plants should be hardened to outdoor conditions by leaving the covering off most of the time for about 10 days before transferring the plants from the plant bed to the field. After a time the covering may be left off entirely, but it should be kept where it can be put on quickly in case of a late spring frost. No matter how well the sweetpotato plants are accustomed to open-air conditions, they will be injured by the slightest frost. The covering for the plant bed will last many years if stored in a dry place when it is not in use. A roof of boards or paper will serve as a covering, but these materials exclude the light and are not so easily handled as the sash or canvas. Where no regular covering material is available, its place may be taken by a layer of fine straw or grass spread evenly over the surface of the bed.

Some growers spread about 3 inches of fine, fresh horse manure over the bed as soon as the sweetpotatoes are bedded; this serves both as a covering and to retain the moisture. When the sprouts begin to appear, a portion of the manure must be removed in order to prevent the plants from becoming too long and slender.

PULLING THE PLANTS

As a general rule sweetpotato plants are set in the field soon after a rain. To avoid delay in planting, the plants should be taken from the bed as soon as the rain ceases and placed in crates or baskets ready for transportation to the field. They should be covered with

a burlap bag, a piece of old carpet, or with hay, straw, or other material, to prevent their drying while being carried to the field. The plants are not all ready at once, and only those that have formed good roots are "drawn," the others being left until later. In "drawing" the plants, the seed potato is held down with one hand, while the plants are removed with the thumb and finger of the other hand. Often five or six plants will cling together at the base, and these should be separated to avoid loss of time in the field. Where plants are to be set with a transplanting machine it is essential that they be in the best possible condition to be handled rapidly by the boys who feed the plants into the machine. The roots should all be kept in one direction, and if the tops are long or irregular they may be trimmed off with a knife.

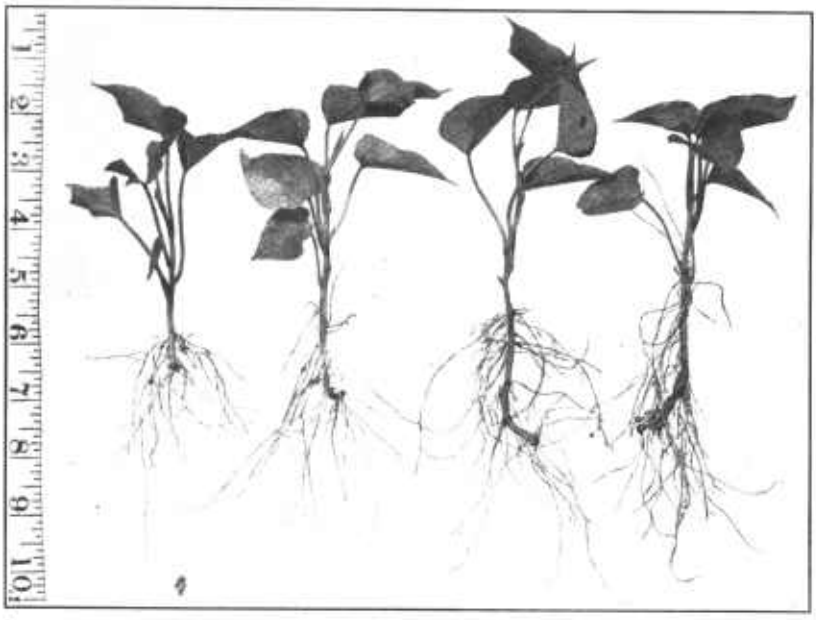

FIGURE 4.—Sweetpotato plants in good condition for field planting, with roots and tops well developed. The two at the right are in the best condition

While pulling the plants it is a good plan to have at hand a large pail or tub containing water and a quantity of clay and cow manure which has been stirred until it forms a thin slime. As the plants are pulled from the bed they are taken in small bunches and their roots dipped into this mixture. This process, termed "puddling," covers the roots with a coating which not only prevents their becoming dry while being handled but insures a direct contact with the soil when they are planted in the field or garden. In case the puddled plants become dry while being handled they must be puddled again before planting, for a covering of dry, caked clay on the roots is a detriment rather than a help.

Figure 4 shows four plants that are at slightly different stages of growth; those on the right are in the best condition for planting.

After removing the plants that are ready, the bed should be watered, to settle the soil where it has become disturbed, and then left for the younger plants to develop.

In preparing sweetpotato plants for shipment or for sale, they are "drawn" from the bed and tied with soft string in bunches of 100 each. Sweetpotato plants will not withstand excessive moisture and should always be packed while the tops are dry. A little damp moss or paper may be placed in the crate or basket and the roots bedded in it, but the tops should remain dry and have ventilation.

PREPARING THE LAND

Sweetpotatoes are usually grown on soil which is easy to prepare. The land is plowed and fitted for this crop practically the same as for corn. The work necessary to thorough preparation will be well repaid by the ease of handling the crop later. It is always desirable that a crop like sweetpotatoes be grown as a part of the regular farm rotation.

The depth of plowing has considerable influence upon the character of the product. The usual depth of plowing in preparing for corn is satisfactory for sweetpotatoes. The fact that the sweetpotatoes are not planted in the field until late in the spring makes it possible for the grower to select a time when conditions are favorable for preparing the land. Plowing may be deferred until the soil has become sufficiently dry to break up fine and mellow. It is important that the land should be harrowed within a few hours after plowing. Further fitting may be deferred until later; and if the soil is inclined to be lumpy, the work of pulverizing may best be done shortly after a shower and while the lumps are mellow. When the primary work of preparation is finished, the soil should be mellow to a depth of 6 or 7 inches and the surface smooth and even. The subsequent handling of the soil preparatory to planting will depend upon whether ridge or level culture is to be followed.

After plowing and fitting, the land is generally allowed to lie several days before being put in condition for planting. If level culture is to be practiced, it is only necessary to run the harrow over the soil once, and then mark in both directions the desired distances for planting. The marking is generally done with either a 1-horse plow, a flat-soled marker, or a disk marker. The disk marker is well adapted to this work, as it throws up a slight ridge which furnishes fresh earth in which to plant. Some growers who practice level culture mark the ground with a small 1-horse plow and throw up a slight ridge upon which to plant; behind the plow a roller is used to compress this ridge to a low, flat elevation. Where the usual ridge method of planting is employed the soil is thrown up by means of a turnplow or disk machine. The ridges should be made at least one week before planting, in order that the soil may become settled and compact. Most of the sweetpotato growers make the ridges whenever the land is in good condition to work and then either roll or drag the tops just ahead of the planters. By using a roller having cleats nailed at equal distances around its surface, the ridges at one operation can be rolled and marked the proper distances for planting.

A drag suitable for smoothing the tops of the ridges can easily be constructed by cleating together three pieces of 2 by 4 inch scantling.

SETTING THE PLANTS

The success of the crop depends largely upon the vigor with which the plants start growth after being removed from the bed and set in the field or garden. Many growers plan to set the plants during a period when conditions are suitable for quick growth, either just before a rain or as soon afterwards as the soil can be worked. The method of setting will depend entirely upon local conditions and the acreage to be grown, the essential requirements being to get the roots in contact with moist earth and the soil firmly pressed about the plants.

The use of water around the roots of the plants is desirable under most circumstances, as it not only moistens the soil but assists in settling it about the roots. A large quantity of water is not necessary, half a pint to each plant being generally considered sufficient. If the plants are puddled, as previously suggested, they can be set without danger of loss even when the soil is dry.

The distance apart at which plants are set in the field depends upon the fertility of the soil, the method of culture used, and the variety of sweetpotatoes grown. Where the drainage is good and where a great deal of cultivation is necessary, level culture is practiced. Under this method the plants are set in a 28-inch check, allowing cultivation in two directions. This eliminates hand hoeing and greatly reduces the cost of cultivation. Growing the potatoes on ridges is the most popular method in most sweetpotato sections. Small ridges are thrown up with a turnplow, from 30 to 48 inches apart, according to the fertility of the soil. On good sandy loam soil the plants are sometimes set on ridges 28 to 30 inches apart and 14 to 18 inches apart in the row, but on the poorer sandy soils the ridges are spaced 32 to 48 inches apart and the plants set 14 to 24 inches apart in the row. With plants set 30 inches apart each way, 7,000 per acre will be required. If the ridges are 30 inches apart and the plants 14 to 18 inches in the row, 10,000 to 12,000 plants will be required to set an acre. Good sweetpotato land will readily support 10,000 plants per acre, but the number to set will depend upon the strength of the soil and the fertilizers used.

Varieties such as the Southern Queen and Porto Rico, which produce a heavy vine growth, are allowed more room than the Yellow Jersey, which makes a small growth of vine.

When level culture is practiced, the field is marked off both ways and the plants set at the intersections of the marks; but when the ridge method is followed it is necessary to indicate distances in the row. This may be accomplished in several ways, one being the cleated roller previously mentioned. Another device of this class consists of three or four wheels upon a long axle and is drawn by a horse, the wheels being so arranged that they can be set at any point on the axle to provide for changes in the spacing of the plants. A drag marker may be used for marking off ridges where it is desired to set the plants in a check.

METHODS AND IMPLEMENTS USED

Where a few hundred plants are to be grown for home use, planting by hand will answer every requirement. A trowel or dibble is used for making a hole to reeeive the plant, and the earth is closed about the roots by a second thrust with the implement, or the heel of the shoe is used to press the earth about the plant. For hand planting, the plants are dropped ahead of the "dibblers" by boys and girls. From 7,000 to 10,000 plants, or an aere, is an exeellent day's work for a planter when everything is in good eondition. Where plants are set in the garden, it is always desirable to water them before elosing the earth about them. Figure 5 shows the method of planting by hand.

FIGURE 5.—Setting sweetpotato plants

PLANTING WITH TONGS

Setting by hand is at best a baek-breaking process, and numerous deviees have been invented to save bending the body in hand planting. One of the simplest of these is a pair of wooden tongs with whieh the plant ean be caught by the root and thrust into the soil. The plants are either dropped ahead or earried in a small basket strapped to the waist of the operator. The tongs are provided with a spring to throw the jaws apart and are held in one hand while the plants are inserted with the other hand. In ease the plants are dropped ahead, the root portion is grasped between the points of the tongs without the use of the hand.

An implement known as a shovel, which is sometimes used in eonjunetion with the tongs, consists of a pieee of lath sharpened to a flat point. This is used to open a hole in the soil ready for the plant.

In using the tongs and shovel, the plants are dropped as for hand planting. The person doing the setting carries the tongs in the left hand and the shovel in the right. The plants are picked up by means of the tongs, while a hole is made by inserting the shovel at the point where the plant is to be set. The plant is then inserted and the earth closed about it either by a second thrust of the shovel or by the foot of the operator. A man expert in the use of these homemade tools can set plants rapidly without bending the body enough to make the work tiresome.

A tool sometimes employed in planting vine cuttings is a long dibble or a cane having in the lower end a notch covered with cloth or leather. The droppers lay the cutting across the row at the proper distances and the planters place the notch over the middle of the cutting and force it into the soil with both ends protruding.

SETTING WITH MACHINES

Where a large acreage is grown, the work of setting the plants in the field is greatly facilitated by the use of transplanting machines, of which several makes are on the market. The essential features of these machines are a device to open a small furrow, a tank for the supply of water, and disks or blades for closing the soil about the plants. With a transplanting machine it is not necessary to wait for a season of favorable moisture, as the machine automatically pours a small quantity of water around the roots of each plant as it is being set. In operating these machines it is necessary to have a steady team and two active boys who are trained to place the plants at proper intervals, as indicated by a spacer on the machine. Under reasonably favorable conditions a machine will plant from 3 to 4 acres a day. In addition to being labor savers, these machines do the work better and more uniformly than it is ordinarily done by hand.

The plants can be set without the use of water, but results are more satisfactory where it is used. Many growers who are most successful use water even when setting after a rain, claiming that the water has the effect of settling the soil firmly about the roots of the plants and that they start into growth much more quickly. Where the full quantity of water is used it will be necessary to provide a man and team to haul the water to the machine. By this method plants may be set during dry weather without the loss of more than one plant out of every hundred.

Most of the transplanting machines are designed for use either on the tops of ridges or on the level. The cost of setting an acre with one of these machines, using water, should be figured on the basis of two teams with drivers and two boys for a period of three or three and one-half hours. If water is not used, there will be a saving of at least one team and driver; also the time required for filling the tank on the machine.

A transplanter in operation is shown in Figure 6.

CULTIVATING

The methods of cultivating sweetpotatoes do not differ materially from those employed with ordinary farm and garden crops. Within a few days after planting, a sweep or a 1-horse plow should be run in the alleys to break out the strip of earth left in ridging. The loose

earth in the alleys should be worked toward the rows until a broad, flat ridge is formed upon which a small-tooth cultivator can be run close to the plants. After each rain or irrigation the soil should receive a shallow cultivation, and during dry weather cultivation is necessary when the surface becomes settled. About two hand hoeings are generally necessary to keep the rows free from weeds and the soil

FIGURE 6.—Transplanting machine in operation

loose around the plants. As hand labor is expensive, it should be the aim to perform the greater part of the work by means of horse tools. Where sweetpotatoes are planted in checkrows and worked in both directions, the hand work required will be reduced to a minimum, but a certain amount of hoeing is always necessary.

When the vines begin to interfere with further cultivation, the crop may be "laid by"; that is, receive a final working, in which the soil is drawn well up to the ridges. To do this it is often necessary to turn the vines first to one side of the row and then to the other by means of a stick or wooden rake. After "laying by," the vines may be allowed to take full possession of the land and very little attention is required until time to harvest the crop.

FIGURE 7.—Device for hilling or "laying by"

Aside from planting and harvesting, the work of caring for a crop of sweetpotatoes can be done almost entirely with ordinary farm and garden tools.

A 2-horse riding cultivator is desirable for the general cultivation, and one having disks instead of hoes will serve for throwing the soil toward the rows. For the work of "laying by," a single-row celery hiller is suitable, or a 1-horse sweep stock can be fitted with sloping boards and used for this purpose, as shown in Figure 7. Many growers use a small 1-horse turnplow for the final cultivation, going twice in each alley and working the soil toward the plants.

HARVESTING

Where sweetpotatoes are grown for the early market they may be harvested when the roots reach marketable size, regardless of season or maturity. In this case the potatoes are dug, crated, and sent to the market for immediate consumption. The main crop of sweetpotatoes, which is intended for storage or for shipping to distant markets at harvesting time, should be well matured before digging. Where freezing weather may be expected early the crop should be dug just before the first killing frost; but where frosts are rather late in the season the yellowing of the vines will indicate that the sweetpotatoes are mature and ready for digging.

Sweetpotato vines are easily injured by a light frost which does not materially injure the roots; but should the vines be frozen there is danger of the frozen sap passing down into the sweetpotatoes and causing them to decay within a short time after harvesting. If the vines have been killed by frost and it is impossible to dig the sweetpotatoes at once, the vines should be cut away from the sweetpotatoes and loose soil thrown over the rows for protection from further cold.

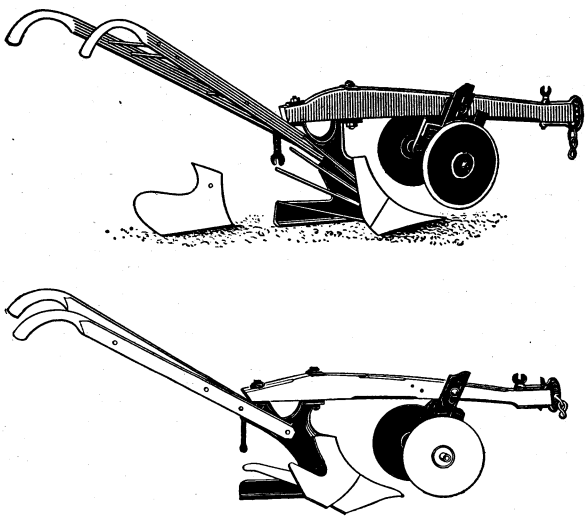

FIGURE 8.—Special plows used for digging sweetpotatoes. The rolling colters cut the vines, and the rods free the sweetpotatoes from the soil and vines

The type of implement used in digging sweetpotatoes will depend upon the area to be harvested. Where a small area for home use is to be handled, an ordinary spading fork is satisfactory; but for a large crop a turnplow with colters on the beam or, preferably, special sweetpotato plows of the type shown in Figure 8 should be employed. This plow has sharp rolling colters on the beam to cut the vines ahead of the plow and iron rods projecting from the moldboard to free the potatoes from the soil and vines. Machines used for digging potatoes are not suitable for harvesting sweetpotatoes, as they bruise and otherwise injure them. In some sections vine cutters are used to run over the rows in advance of the plow. A disk harrow is sometimes used for this purpose with the central disks removed. This cuts the vines well, but at the same time cuts many of the sweetpotatoes that are near the surface.

After the sweetpotatoes are dug they should be scratched out and allowed to dry. A field of sweetpotatoes at this stage is shown in Figure 9. It is a bad practice to throw several rows of

sweetpotatoes together, as they will be bruised and become more susceptible to decay. They should not be exposed to the sun very long and should not be left out over night. It is desirable that the soil be comparatively dry at the time of harvesting, and warm, clear weather is best for the proper handling of the crop.

In some of the eastern sections the sweetpotatoes are sorted in the field and gathered into hampers, in which they are hauled to the depot platform, where they are packed into barrels and headed. More than half of the crop in this region, however, is packed in the field without the use of packing sheds. The general custom is to grade the sweetpotatoes in the field, so as to eliminate the extra handling necessary if sorting is done later.

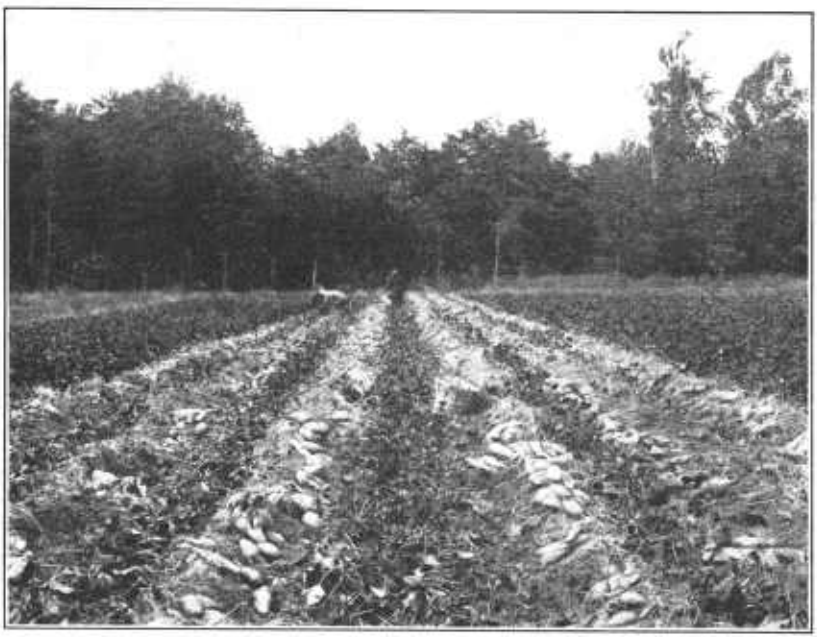

FIGURE 9.—A sweetpotato field at harvest time. After plowing, the sweetpotatoes are scratched out by hand and allowed to dry before being placed in barrels or baskets

When the sweetpotatoes are to be stored, a good plan is to gather them directly from the row into baskets and load these baskets on a spring wagon to be hauled to the storage house and dumped carefully into the bins. In grading them in the field the grower should first go over the row and pick up all the marketable ones except those cut and bruised; then pick up all the very large, the very small, and the injured ones. These should be placed in separate bins in storage.

SELECTING SEED

The selection of seed is of vital importance in successfully growing sweetpotatoes. Careful seed selection aids greatly in controlling diseases, increasing yield, and improving the type. Before starting

selection work the grower should have in mind his ideal type of sweetpotato and should plant and select only those which most nearly conform to this ideal. Selection should be made in the field at harvest time. In this way the grower can see the vine growth, the yield per hill, and the relative size and shape of the sweetpotatoes. Select only medium-sized well-shaped roots from productive hills free from disease. To insure that they will keep during storage, these roots should be well matured and free from injuries of any kind. The seed potatoes should be kept separate in storage and receive special care. They should not be handled or sorted until bedding time in the spring, as the more they are disturbed in storage the greater will be the loss by decay. At bedding time they should be sorted carefully, with special attention to freedom from disease and to uniformity of type. Sweetpotatoes from vine cuttings are very desirable for seed, as the danger of transmitting disease from the plant bed to the field is lessened by their use.

STORAGE

The sweetpotato requires a dry atmosphere and a warm, uniform temperature in storage. Where a large quantity is to be stored, a specially built storage house should be provided. A few for home use may be placed in crates and stored in a loft over the kitchen or in the basement near the furnace. But even for home use a small storage house or storage room in connection with buildings used for other purposes is most desirable. A sweetpotato storage house should be so constructed that a uniform temperature can be maintained, the influence of the outside temperature reduced to the minimum, and plenty of roof and floor ventilation provided. A great deal of the success of storage will depend on the careful handling of the crop at harvesting time, thorough curing of the sweetpotatoes as soon as they are placed in storage, keeping the house free from moisture by judicious regulation of the ventilators, and maintaining a uniform temperature throughout the storage period after the curing process.

For further information on the storage of sweetpotatoes and storage-house construction see Farmers' Bulletin 1442, Storage of Sweet Potatoes.

GRADING AND MARKETING

Even a well-grown crop of sweetpotatoes may lose a large part of its market value through lack of proper care in digging, handling, and preparation for market. Precaution must be observed when digging and handling to prevent a well-grown product from becoming unsightly because of cuts, bruises, and other defects. Appearance is a big factor in the sale of any lot of sweetpotatoes.

The Bureau of Agricultural Economics has adopted a set of market grades for sweetpotatoes. Every grower should obtain a copy of these grades, as it is important not only that the stock be of attractive appearance, but also that it be separated into specially defined grades if it is to be marketed to the best advantage. Grading is necessary in order to give the consuming public what it demands.

The type and appearance of the container have an important bearing upon the final value of the goods. Never use a dirty, second-hand, wooden container of flimsy construction just because it is "cheap." Use barrels, baskets, hampers, or crates that are strongly made and bright and clean in appearance. Never purchase a package that looks clumsy or is short in measure. The law requires that barrels, baskets, and hampers conform to the United States standard. A hamper, basket, or crate having the capacity of a standard dry bushel is recommended.

A bag should never be used as a container for sweetpotatoes, as it furnishes no protection, and the contents are easily bruised, scarred, and skinned. Sweetpotatoes that are bruised in handling turn dark in a short time, and decay starts almost immediately. The market value of many lots of sweetpotatoes is ruined because of the use of bags.

When packing, use care not to bruise or otherwise injure the stock by rough handling. Bruises and cuts injure the appearance and lower the grade and may cause considerable loss by giving opportunity for rot spores or organisms to enter. See that your packages are well filled and that the stock has been carefully shaken down or settled to prevent the container from being "slack" when it reaches the market.

Daily price reports on the sweetpotato market are issued by permanent market stations located in the larger cities of the country. A request addressed to the Bureau of Agricultural Economics, Washington, D. C., will bring these reports to you.

Experienced inspectors have been stationed in many of the larger markets throughout the country and their services are available to shippers of sweetpotatoes who desire to obtain reports upon the condition of their consignments on arrival or upon a rejection or a dispute between shipper and buyer. A list of these inspectors and the markets in which they are located can be obtained from the Bureau of Agricultural Economics. For quick action in case of a dispute, telegraph to the office of the Bureau of Agricultural Economics, United States Department of Agriculture, located in your nearest market city, or to the bureau at Washington, D. C.

COMMERCIAL VARIETIES

Of the many varieties of sweetpotatoes grown, only about nine are important from the market standpoint. The choice of a variety should depend upon the market and the purpose for which the sweetpotatoes are to be used. The northern markets as a rule prefer a dry, mealy root of the Jersey type (fig. 10), although some of the moist-fleshed varieties, such as the Nancy Hall and the Porto Rico, find a ready sale when they have been properly stored and graded and are placed on the market in good condition.

The southern markets demand a moist-fleshed variety. (Fig. 11.) The Nancy Hall and the Porto Rico are the most popular varieties, although the Dooley, the Pumpkin "Yam," and others meet with ready sale. When the sweetpotatoes are grown for stock feed, only the highest yielding varieties should be considered. The Yellow Strasburg variety is especially valuable for this purpose.

The Big-Stem Jersey, Yellow Jersey, and Gold Skin are the best-known dry-fleshed sorts, while the Porto Rico, Nancy Hall, Dooley, Pumpkin "Yam," and Southern Queen are the best known of the

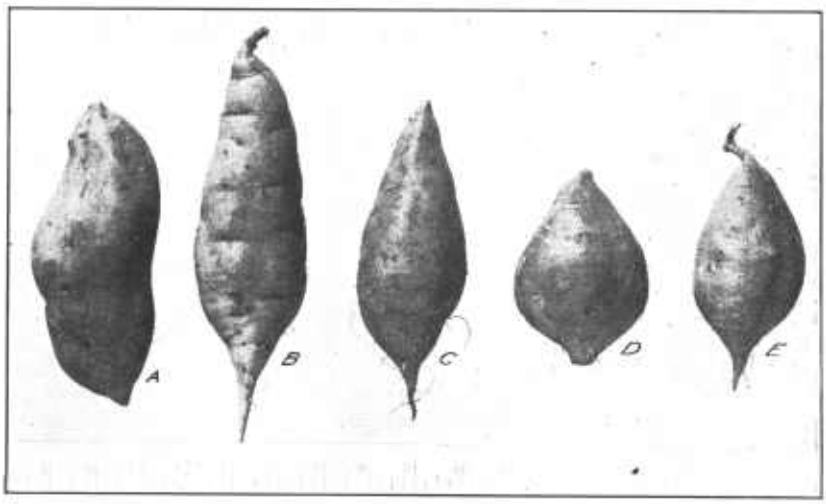

FIGURE 10.—Some of the important commercial dry-fleshed varieties of sweetpotatoes: A, Big-Stem Jersey; B, Triumph; C, Yellow Jersey; D, Yellow Jersey; E, Red Jersey. Note the two distinct types of the Yellow Jersey variety

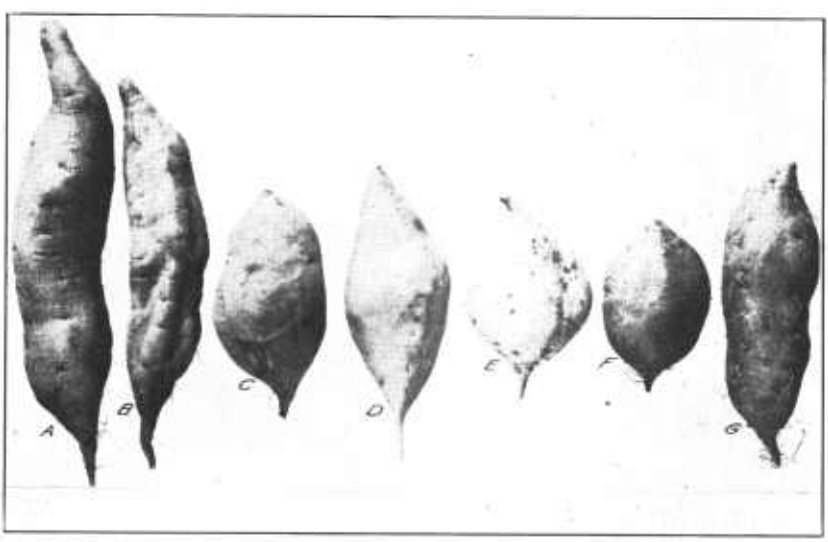

FIGURE 11.—Typical specimens of some of the commercial moist-fleshed varieties of sweetpotatoes: A, Yellow Belmont; B, Pumpkin "Yam"; C, Porto Rico; D, Nancy Hall; E, Southern Queen; F, Dooley; G, Bunch

moist-fleshed types. The Triumph is a medium moist variety and is in considerable demand.

Big-Stem Jersey.—The vines are moderately large; long, 6 to 12 feet; stems green, hairy; leaves shouldered or entire, hairy above and smooth beneath,

green; petiole hairy, green. Roots russet yellow in color, smooth and regular, long fusiform in shape, may be veined or smooth, small to large in size, but larger than Yellow Jersey or Red Jersey; season medium to late; flesh yellow.

Yellow Jersey.—The vines are small, slender, long, 6 to 12 feet; stems green, hairy, often flattened; leaves shouldered or entire, hairy only on the upper surface, green; petioles green, hairy. Roots dark russet yellow, long or short fusiform to globular or ovoid in shape (two types are known on the market, one long fusiform and the other very short), smooth or veined, small to medium in size; season medium; flesh yellow.

Gold Skin.—Vines medium to long, 6 to 10 feet, slender, hairy, especially at nodes, green in color; leaves shouldered or entire (both may be found on same vine), light green, hairy above, slightly hairy beneath; petioles short, slender, hairy, green except slight tinge of purple at base of leaf blade. Roots dark russet yellow, fusiform in shape, smooth and regular; season medium; flesh salmon.

Porto Rico.—Vines medium to long, 5 to 10 feet; stems coarse, internodes short, reddish purple in color, hairy especially at the nodes and on young growth; leaves shouldered, large in size, green except purple at base of blade and on veins, slightly hairy on upper surface, smooth below; petioles medium long, 5 to 8 inches, reddish purple in color, deeper at the base of the leaf blade, color extends up on veins of lower side of leaf, color also deeper at base of petiole. Roots light rose to rose in color, fusiform to globular and irregular in shape, smooth; flesh orange-yellow to salmon.

Nancy Hall.—Vines medium in length, 4 to 8 feet; stems somewhat hairy, green; leaves toothed or entire with 4 to 10 low marginal teeth, hairy on upper surface and slightly hairy or smooth beneath, green except a reddish purple stain at the juncture of the blade and petiole, the latter slightly hairy, green except at upper end. Roots yellow tinged more or less with salmon, veined, or smooth and regular, fusiform in shape, medium to large in size; season early. Of excellent quality.

Dooley.—Vines long to very long, 10 to 15 feet; stems green, slightly hairy, especially at the nodes; leaves shouldered or often entire; green in color, hairy above and smooth beneath; petioles green, slightly hairy. Roots large in circumference, short fusiform in shape, yellow to salmon in color; flesh dark orange.

Pumpkin "Yam."—Vines moderately large; long, 6 to 12 feet; stems green, hairy; leaves low, shouldered, hairy only on the upper surface, green; petioles green, hairy. Roots yellow tinged with salmon, mostly irregular with prominent light-yellow veins, some smooth and regular with few or no veins, fusiform in shape, medium in size; season late; flesh dark orange yellow.

Southern Queen.—Vines large and vigorous; long, 6 to 12 feet; stems dull purple, slightly hairy at nodes and on new growth; leaves shouldered or entire, slightly hairy above, green; petioles nearly smooth, greenish purple. Roots white or light yellow, sometimes very slightly tinged with pink, smooth and regular, few or no veins, fusiform, globular or ovoid in shape, medium to large; season medium; flesh light yellow.

Triumph.—Vines coarse and vigorous; short, 2 to 4 feet; bushy; leaves shouldered, large and thick, hairy on veins of upper surface, smooth beneath; petioles green, with purple stain at base of leaf blade, and extending up the veins of the undersurface of the leaf. Roots medium to long, cylindrical in shape, light yellow to russet yellow in color; flesh light yellow.

SWEETPOTATOES FOR MANUFACTURE

With the recent development of commercially feasible methods of starch recovery from the sweetpotato by the Department of Agriculture, there is a new interest in the crop and a number of new production and handling problems to be considered. Sweetpotato starch has been proved equal or superior to certain other starches of domestic and foreign origin for use in numerous manufacturing processes, particularly in the textile and paper industries and in making adhesives. Although sweetpotato-starch production is at present (1938) still on a more or less experimental basis, its apparent

practicability warrants brief reference here to some of the production and handling problems that the grower or producer will doubtless face.

Since starch for industrial use is a relatively low-priced commodity, it can be profitably obtained only from low-cost raw material or sources. Prices that can be paid to farmers for sweetpotatoes for starch are determined largely by the prices of competitive starches from either domestic or foreign sources. In recent years cornstarch, for example, has been priced at about 3 cents per pound. A bushel of sweetpotatoes of a variety with fairly high starch content will yield about 10 pounds of starch.

It is obvious that prices for starch stock cannot approach those expected by growers for high-quality, well-graded table stock. On the basis of present knowledge it appears that a commercial sweetpotato-starch industry can be developed only if farmers can afford to produce sweetpotatoes for a delivered price of about $7 to $8 per ton, or about 20 cents per bushel. Costs of production have been estimated at $40 to $60 per acre, exclusive of grading and packaging. Thus, average yields of 200 to 300 bushels, respectively, must be obtained to meet all costs of growing and harvesting. Sweetpotatoes for starch need not be graded as to size or appearance, so the total harvest can be sold. Also no market packages are needed. The high yields necessary for profitable production would seem to preclude the use of marginal and submarginal lands in growing sweetpotatoes for starch and will also necessitate careful choice of the best adapted varieties and the employment of the most up-to-date methods of culture and disease control.

Extensive work is in progress by the Department of Agriculture and several State experiment stations to develop higher-yielding, higher-starch sweetpotatoes that will be especially adapted to manufacturing purposes. In the lower South, the Triumph appears at this time to be unsurpassed by any of the common sorts for starch production, but this variety is not adapted to the northern part of the commercial sweetpotato growing region of the country. The so-called dry-fleshed varieties like Yellow Jersey, Big Stem Jersey, Little Stem Jersey, and related sorts are quite low in starch as compared with Triumph, Porto Rico, and Nancy Hall.

The sweetpotato has been considered as a source of fermentable carbohydrates for production of industrial alcohol. Although alcohol can be successfully manufactured from sweetpotatoes, it appears improbable that they will become an important factor in the industry in the near future because other materials, such as grain and molasses, have considerable advantages over sweetpotatoes, particularly the ease and cheapness with which they can be handled and stored over long periods to permit year-round operation of distilleries. Sweetpotatoes grown for alcohol should have approximately the same value as stated above for starch. The economics of the crop will be roughly the same for both uses.

DISEASES

The sweetpotato is subject to injury from a number of diseases that may attack the young plants in the hotbed or the growing crop in the field or cause decay in storage. The worst of these are stem

rot, black rot, foot rot, soft rot, or ring rot, and, in the Southwest, root rot. Descriptions, illustrations, and control measures are given in Farmers' Bulletin 1059, entitled "Sweet-Potato Diseases."

The heavy losses from disease and decay now suffered in some sections are in large part avoidable through the methods recommended. Prevention may well begin at harvest time with the selection of sound, healthy roots to store and to save for seed. Use care in handling to avoid bruises, put no diseased potatoes into storage, and cure and store in suitable houses at the temperatures recommended in Farmers' Bulletin 1442, Storage of Sweet Potatoes. It is of fundamental importance to set only healthy plants in the field. Purchased stock should be examined with the utmost care and diseased slips rejected. Those who grow their own plants should follow the directions given in Farmers' Bulletin 1059 for disinfecting the beds and sorting and treating the roots planted.

INSECT ENEMIES

The sweetpotato is not seriously injured by many insects, but the sweetpotato root weevil has been very injurious in sections of the South, especially in the Gulf Coast States. This insect threatens to become a serious menace to sweetpotato growing.

Cutworms frequently destroy the young plants by cutting them off soon after they are set in the field.

For full information on insects affecting the sweetpotato, write to the Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

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